ssociation Française
e Normalisation
R
rue N.D. des Victoires
RIS 2° - Tél. CEN.95-80

I S O
ORGANISATION INTERNATIONALE DE NORMALISATION
INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO/TC 97/GT B
JEUX DE CARACTERES ET CODAGE
Secrétariat :
FRANCE

ISO/TC 97/GT B
(Secr.5) 16
Juin 1962

Destinataires : Comités-membres du groupe B
ECMA, UIC

PROJET DE
COMPTE RENDU DE LA 2e REUNION
(PARIS 2-4 mai 1962)

DRAFT REPORT
ON THE SECOND MEETING
(PARIS 2-4 May 1962)

SOMMAIRE - SHORT CONTENTS LIST

	pages Français	English
Liste de présence - Attendance	1 - 2	
Ordre du jour - Agenda	3	4
Comptes rendus succincts - Minutes		
- Réunions du 2 mai - 2nd May meetings	5-7-9-11	6-8-10-12
- Réunions du 3 mai - 3rd May meetings	13 à 16	13 à 16
- Réunions du 4 mai - 4th May meetings	17 à 20	
Résolutions	21	22
Proposition A Proposal A	23 et 25	23 et 25
Proposition B Proposal B	25 et 26	25 et 26
Notes	27	28
Abréviations - Key to the abbreviations.		29

Annexe A : Extraits du document (USA 2)5
Annexe B : Extraits du document (France 1)6
Annexe C : Extraits du document (RU 3)13

PG/mb
Arc. : 737 E

NMAH 310/3

REUNION DU 2 AU 4 MAI 1962 à PARIS.

LISTE DE PRESENCE *

PRESIDENT :	M. FEISSEL	Ingénieur à la Compagnie des machines BULL
ALLEMAGNE	M. ULBRICH	Dr., Ingénieur, Telefunken Gerberstr. [illegible], Backnang/Wurtt.
	M. BAUER	Prof. Dr., mathématicien Universitaet Mainz
	M. LOCKEMANN	Dr., Ingénieur Siemens & Halske Hofmannstr. 51, Munich
ETATS-UNIS D AMERIQUE	M. L. BLOOM	The national Cash Register Company Electronics division 1401 East el segundo Boulevard-Hawthorne Californie
	M. J. BOOTH	Teletype Corporation, Room 624 233 Broadway, New-York 7, New-York
	M. L. GRIFFIN	Navy Department - Navy Management Office Washington 25, DC, USA
	M. A.L. WHITMAN	Bell Telephone Laboratories 463 West St., New-York, N.Y.
	M. R.E. BLUE	IBM - 112 E Post Rd. White Plains, New-York
FRANCE	M. R. FRONTARD	Directeur à l'AFNOR
	M. BEAUGONIN	Ingénieur à la Cie des machines Bull
	M. DURAND	Ingénieur à la Cie des machines Bull
	M. J.M. GUILHAUMOU	Ingénieur à la Cie IBM France
	M. HENRY	Ingénieur à l'Electricité de France

.../...

---

* On a souligné le nom du Chef de délégation

ITALIE	M. Richard GOTTLIEB	Laboratoire de Recherches Electroniques Sté Olivetti Via del Parlamento 33, BORGO LOMBARDO (Milano)
ROYAUME-UNI	M. G. CHADWICK	B.S.I.
	M. W. EADIE	IBM United Kingdom Ltd.
	M. H. Mc G. ROSS	Ferranti Ltd.
	M. J.R.W. SMITH	British Telecommunications Research Ltd.

ORGANISATIONS INTERNATIONALES :

ECMA	M. E G. CLUFF	I.C.T. - Gloucester House 149, Park Lane LONDRES W1
Union internationale des Chemins de Fer (UIC)	M. P. BIENFAIT	Ingénieur à la Sté Nationale des Chemins de Fer Belges 21, rue de Louvain, BRUXELLES

Secrétariat ISO/TC 97/GT B :

M. P. GIRET	AFNOR
Mme LADEFROUX	AFNOR

Interprète :

Mme E. UMANSKY

.../...

MINUTES OF THE MEETINGS HELD ON

May 2nd, 1962

MORNING

Item 1

Mr. FRONTARD, director of AFNOR, welcomes the delegates.

Item 2 : Roll call of the delegates

The following amendments were made to the list of delegates (doc. 7).

Germany : delete M. ZSCHEKEL.

United States : Mr.R.E. UTMAN will arrive in the afternoon.
add. : Mr. A.L. WHITMAN, Bell telephone laboratories - 463, West str. New-York, N.Y.

U.I.C.: Replace Mr. SCHOONJANS by Mr. P. BIENFAIT.

Item 3 : Election of the Chairman

M. FEISSEL, engineer of the Bull C° was elected chairman of the meeting.

Item 4 :

MMrs BOOTH (USA), CHADWICK (U.K.) and DURAND (France) were elected to the editing Committee.

Item 5 :

The following amendments were made to the agenda :

add to item 8 :

- To have liaison between working group B and working group E, which will include a report of working group B activities for submission to WG E in Stockholm (8-10 May 1962) and an explanation of the programme of work on characters sets and coding being undertaken by group B.
- The possible transfer of working group to Sub-Committee status.

Item 6 : Report on the activities of the group B

The group noted the first part of the report on its activities.

.../...

Item 7 : Documents

The following documents had been received by the secretariat and distributed :

- the draft British Standard (document N 3), which had since become an official standard,
- Draft USA standard (document N 4).

The following were distributed at the beginning of the meeting :

-(USA 2) 5	Expository remarks on the proposed american standard code for information interchange ;
-(France 1) 6	Opinion of the French member-body concerning character sets and coding ;
-(UK 2) 8	Proposal for compatible code for information interchange ;
-(Paris 1-10)	German contribution : Information processing code ;
-(Paris 2-11)	Recommended code for information interchange (brought by the American delegation).

Item 8 : First elements of an international agreement

The delegations explained the studies at present taking place in their own countries.

Mr. ROSS stated that the draft British Standard sent to the secretariat had since become a published Standard which gave it a greater authority. He referred to the distribution of a U.X. proposal for a compatible code for information interchange (document (UK2) 8 and explained that it attempted to achieve compatibility between the work of ASA, ECMA, BSI and EEA.

Mr. BLOOM (USA) stated that the proposed American Standard code for information interchange was at present going through their acceptance procedure. Attached to the American paper handed round was another sheet giving the draft prepared for the Bell System which was still subject to amendments but which that company did not wish to be delayed. Mr. BLOOM drew on the blackboard an explanation of the principal characteristics of a seven-bit code and showed where it could be extended and contracted. He also referred to the possibility of an eight-bit code.

AFTERNOON

Mr. BLUE (IBM-USA) and later, Mr. UTMAN (ASA X3.2 Secretary) join in the US delegation.

Mr. DURAND (France) then gave the French point of view, and explained their document N 6, with its appendix.

.../...

The French delegation called the attention of the group to the problem of compatibility codes or draft codes proposed to the working group.

An exchange of views made it clear that no delegation intented to study the problems of punched cards and compatible codes as a task of immediate urgency.

It was thought that the problems should probably lead to distinct ISO studies, but later on, after the six bit code will have become an ISO recommendation.

Mr. LOCKEMANN gave the point of view of the German delegation.

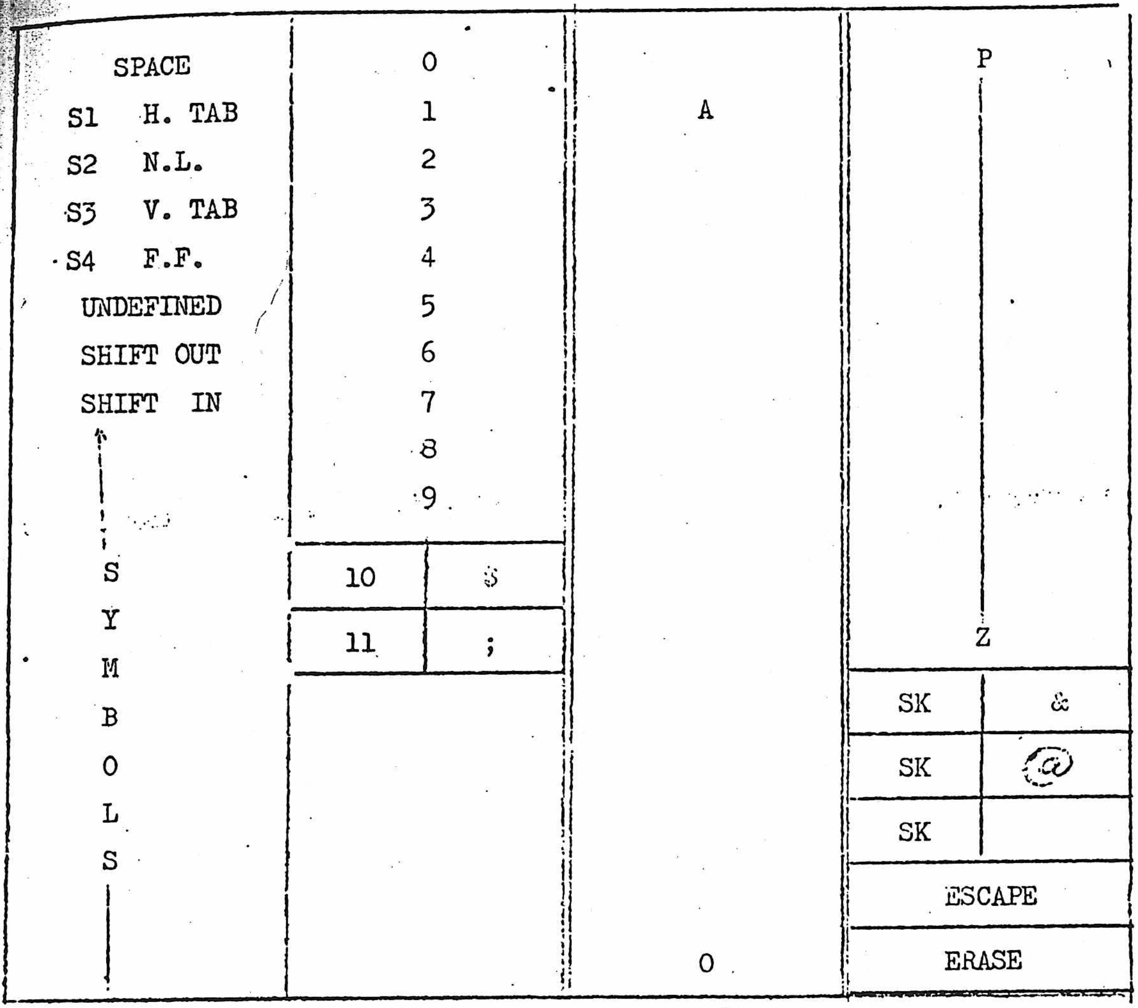
His essentiels points were the following :
- the arrangement of controls, which is the same as the one adopted by the USA and almost in the same sequence,
- the coding of SPACE, distinct from the codes NULL or NO ACTION, which they wished to locate in an "all zero" position.
- the alphabet which they would prefer to start right on top of column, not at the second place ;
- the practical use of the CCITT regulations.

At the invitation of the Chairman, Mr. BIENFAIT (UIC), stated the opinion of his organisation and he was followed by Mr. CLUFF (ECMA) who gave an account of their activities and a short explanation of some of the items on which agreement had tentatively been reached.. He showed these results on the blackboard and they are included in these minutes. (See fig. 1 hereafter).

A small ad hoc group consisting of four people only was then formed and charged with examining the various documents before the committee. It should pick out where they work in agreement and where they vary and should attempt to prepare a proposal based on theirfindings. This proposal should if possible find a solution to the various problems. This group would meet on Thursday morning and submit their report to the full meeting in the afternoon.

The members of the ad hoc group were named as MMrs. BLOOM, DURAND, LOCKEMANN and ROSS, who were representatives of those members who had submitted written proposals. MMrs. BIENFAIT, CLUFF and GOTTLIEB would attend as observers and Mr. FEISSEL would attend ex officio.

.../...



SPACE	0			P	
S1 H. TAB	1		A		
S2 N.L.	2				
S3 V. TAB	3				
S4 F.F.	4				
UNDEFINED	5				
SHIFT OUT	6				
SHIFT IN	7				
↑	8				
	9				
S	10	$			
Y	11	;		Z	
M				SK	&
B				SK	@
O				SK	
L					
S				ESCAPE	
↓			O	ERASE	

Figure 1

The special signs accepted are : + - . , / * ( )

Their positions is not defined exactly but it appears to be agreed that the signs . - / should be placed at the lower end of the first column.

.../...

Thursday, May 3rd, 1962

MORNING

The ad hoc group met and

1°- proposed the two alternative solutions as shown in the following tables A and B :

Table A
Tableau A

	7 bit		6 bit
	000	001	00
	NULL		NULL
TC 4	EOT	DC4 (STOP)	F4 (FF)
TC 3	EOM	DC3	F3 (VT)
TC 2	EOA	DC2	F2 (NL)
TC 1	SOM	DC1	F1 (HT)
	WRU	ERROR	SPACE
	RU	SYNC	S/O
	BELL	EOB	S/I
		S5 (LEM)	
	E4 (FF)	S4	
	E3 (VT)	S3	
	E2 (LF)	S2	
	E1 (HT)	S1	
	CR	SO	
	S/O		
	S/I		

Table A
Tableau A

7 bit		6 bit
000	001	00
NULL		SPACE
TC1 (SOM)	DC1	F1 (H Tab
TC2 (EOA)	DC2	F2 (NL)
TC3 (EOM)	DC3	F3 (V Tab
TC4 (EOT)	DC4 (STOP)	F4 (FF)
TC5 (WRU)	ERROR	F5
TC6 (RU)	SYNC	S/O
TC7 (BELL)	EOB	S/I
	SO	
FE1 (HT)	S1	
FE2 (NL)	S2	
FE3 (VT)	S3	
FE4 (FF)	S4	
FE5 (CR)	S5 (LEM)	
S/O		
S/I		

Figure 2

.../...

2° - reached an agreement, relating to the arrangement of some graphic symbols, as shown hereunder :

010	011		100	101		110	111
SPACE	0			P			
	1		A	Q			
	2		B	R			
	3		C	S			
	4		D	T			
	5		E	U			
	6		F	V			
	7		G	W			
(	8		H	X			
)	9		I	Y			
*	10	;	J	Z			
,	11		K	Å	@		
.			L	Ä			
-			M	Ö			
+			N		<-	----------	------ ESC
/			O		<----	----------	------ DEL

3° - listed as follows the other graphics for which places are to be assigned in the table :

C.S & % : = . < > = %
¿ & ¿
£ % &
etc =

NULL is a symbol for which a place has to be assigned in the case of table B.

AFTERNOON

The ECMA representative gave objectively the results to plenary meeting.

On the Chairman's request, each delegation and international organisation gave their opinions on these results and the agreements in favour and against the proposed solutions. No agreement could be reached, the opinions being divided between solutions A and B.

A second meeting of the ad hoc group is to take place on Friday from 8.45 to 10.30 a.m. in order to try to arrive at a compromise.

The plenary group will resume its work at 10.30 a.m.

.../...

Friday, May 4, 1962

(Meetings were on Thursday afternoon and on Friday morning.)

MORNING

Point 8 (Following)

The ad hoc group meets again from 8:45 to 10:30 A.M.

The plenary meeting is opened at 10:30 and Mr. Cluff shows the results of the ad hoc group meeting.

Thanks to a spirit of agreement, Solution B could be amended and above all completed, thus resulting in the following complement to the 7 bit table:

Left column, 1st character	TCO NULL
	FEO between TC 7 (Bell) and FE1 (HT)
Right column, 1st character	DCO
2 last characters	S6 and S7

Table 6 bit

NULL
A
B

Fig. 3

It had been suggested that, in cases where the code space "all zeros" is difficult, it would be possible:

- either to modify (reverse) the NULL and SPACE symbols
- or, preferably, to reverse both columns 00-01 and 10-11 by reversing B1

Mr. Cluff and Mr. Bloom explain the new code table drawn on the 2nd blackboard and which shows the relationship between the code and the keys of the keyboards.

Correspondence of symbols on the keys of the typewriter keyboard

Mr. Bloom shows on the blackboard the main requirements established by this problem (the problem of correspondence of symbols on the keys).

Particularly, he puts forward:

- that the most used symbols be arranged to be put on the keys carrying the figures;
- that a symbol which is not used outside of scientific applications be associated with the "comma" (,) symbol, in order that in certain applications the comma symbol (,) could be repeated on both the upper and lower case of a keyboard.

This is shown in Figure 4 where the positions of the symbols in the 3rd and 4th columns of the B table and on the typewriter are put together (are adjacent to one another).

	010	011
	␢	0
! 1	!	1
" 2	"	2
# 3	#	3
$ 4	$	4
% 5	%	5
& 6	&	6
' 7	'	7
(8	(	8
) 9	)	9
: *	*	:
; +	+	;
< ,	,	<
= -	-	=
> .	.	>
? /	/	?

Figure 4

COUNT OF THE OPINIONS

The President proceeds to take a count of the opinions between the A and the B solutions so amended, with the following results:

Preference for the A solution: The German delegates.

Preference for the (amended) B solution: The delegates from France, Great Britain and U.S.A.

Abstention: The delegate from Italy.

It is understood that this count of opinions is not a vote in the sense of procedures of the ISO and that each delegation wishes to discuss the new propositions within its own national committee. It is decided that the two solutions A and B be voted by correspondence, reporting that the B solution had been preferred by the majority of the experts present.

The two A tables and the two B tables would have to be shown in a complete form along with some explanatory notes.

AFTERNOON

Point 8 (end)

The group puts in a complete form the presentation of the 7 bit and 6 bit codes in accordance with the A and B solutions and puts the explanatory notes in a final form.

Point 8 A

Liaison between the B group and the E group.

The group decides that Mr. Henry, assisted by Mr. Chadwick, Mr. Eadie and Mr. Utman, will present in Stockholm (May 8-10) a report about this meeting dealing with: the solutions 1 and 2, the tables A and the tables B along with notes.

Point 8 B

Eventual conversion of the working group B to a sub-committee.

The group discusses the advantages and the disadvantages of both work in working group and in sub-committee. A sub-committee is more autonomous, but the rules of the ISO are more strict (sending of the preparatory documents 4 months before the meeting). The British delegation reports that in some ISO committees the technical work performed by a mere working group is very satisfactory.

Finally, it is decided to ask TC 97 that the group become a sub-committee.

Point 9 - Vote on the resolutions

Point 10 - Place and date of the next meeting

The staff performing the work of editing the resolutions presents 4 resolutions.

Resolution #1 on the A and B solutions about a 7 bit code with a 6 bit related code;

Resolution #2 on the report dealing with the liaison between group B and group E;

Resolution #3 about the transformation of the B group into a sub-committee;

Resolution #4 approving the Secretariat's staff plan for a working group meeting in October in Paris.

These resolutions are read in English then in French and separately submitted for voting by the present delegations. They are all accepted unanimously.

Point 11 - Conclusion of the meeting

The President thanks the delegates.

Mr. Chadwick, in the name of the group, thanks the President, the secretary and the interpreter.

RESOLUTIONS

Resolution 1

The Working Group decides that the analysis given in document 14 (with the addition of 4 th May), together with the table put on the board during 4 th May should be presented together and sent to all member bodies of the W.G. as soon as possible.

These tabulations are referred to as A and B.*

Both proposals A and B are seven-bit coded sets with a related 6-bit coded set, but B which is preferred by a majority of the delegations present at the meeting results from compromises made several delegations.

The W.G. requests its P. members to send their opinions to the secretariat for or against proposal B by 15th September 1962.

Resolution 2

The WG decides that the paper referred to in Resolution 1 should form the liaison report to be sent to W.G. E for their STOCKHOLM meeting.

Mr. HENRY, assisted by Messrs. CHADWICK, EADIE and UTMAN, is requested to represent this Working Group at W.G. E.

Resolution 3

The Working Group decides to recommend to Technical Committee ISO/TC 97 that its future status should be that of a Sub-Committee.**

Resolution 4

The W.G. approves the Secretariat's draft for a meeting of the group to be arranged in PARIS, in October 1962, on the occasion of the plenary meeting of the Committee ISO/TC 97.

---

* See tables on following pages
** The U.K. abstained from voting

.../...

A

Ⓐ 6 Bit Coded Set - Code à six moments

	00	01	10	11
0000	NULL	0	UNASSIGNED	P
0001	F_4 (FF)	1	A	Q
0010	F_3 (VT)	2	B	R
0011	F_2 (NL)	3	C	S
0100	F_1 (HT)	4	D	T
0101	SPACE	5	E	U
0110	SO	6	F	V
0111	SI	7	G	W
1000	(	8	H	X
1001	)	9	I	Y
1010	:	10 or *	J	Z
1011	;	11 or +	K	① or [
1100	, (Comma)	③ Cur Sign or <	L	① or \
1101	-	③ % or =	M	① or]
1110	.	③ & or >	N	ESCAPE
1111	/	' (Apostr.)	O	DELETE

① cf. Note 1
③ cf. Note 3

Ⓑ 6 Bit Coded Set - Code à six moments

	00	01	10	11
0000	SPACE	0	NULL	P
0001	F_1 (HT)	1	A	Q
0010	F_2 (HL)	2	B	R
0011	F_3 (VT)	3	C	S
0100	F_4 (FF)	4	D	T
0101	F_5	5	E	U
0110	SO	6	F	V
0111	SI	7	G	W
1000	(	8	H	X
1001	)	9	I	Y
1010	:	10 or *	J	Z
1011	;	11 or +	K	① or [
1100	, (Comma)	③ Cur. Sign or <	L	① or \
1101	-	③ % or =	M	① or]
1110	.	③ & or >	N	ESCAPE
1111	/	' (Apostr.)	O	DELETE

① cf. Note 1

③ cf. Note 3

A

Ⓐ 7 Bit Coded Set Code à 7 moments

	000	001	010	011	100	101	110	111
0000	NULL	UNASSIGNED	SPACE	0	@	P	UNASSIGNED	UNASSIGNED
0001	TC_4 (EOT)	DC_4 (STOP)	!	1	A	Q		
0010	TC_3 (EOM)	DC_3	"	2	B	R		
0011	TC_2 (EOA)	DC_2	#	3	C	S		
0100	TC_1 (SOM)	DC_1	② $	4	D	T		
0101	WRU	ERROR	② %	5	E	U		
0110	RU	SYNC	② &	6	F	V		
0111	BELL	EOB	② ' (Apostr.)	7	G	W		
1000	UNASSIGNED	S_5 (LEM)	(	8	H	X		
1001	FE_4 (FF)	S_4	)	9	I	Y		
1010	FE_3 (VT)	S_3	:	*	J	Z		
1011	FE_2 (LF)	S_2	;	+	K	① [		
1100	FE_1 (HT)	S_1	, (Comma)	② <	L	① \		
1101	CR	S_0	-	② =	M	①]		
1110	SO	UNASSIGNED	.	② >	N	↑		ESCAPE
1111	SI	UNASSIGNED	/	② ?	O	←		DELETE

B

ISO/TC 97 - 3 et 4 Mai 1962

Ⓑ 7 Bit Coded Set - Code à 7 moments

	000	001	010	011	100	101	110	111
0000	TC_0 (NULL)	DC_0	SPACE	0	@	P	UNASSIGNED	UNASSIGNED
0001	TC_1 (SOM)	DC_1	!	1	A	Q		
0010	TC_2 (EOA)	DC_2	"	2	B	R		
0011	TC_3 (EOM)	DC_3	#	3	C	S		
0100	TC_4 (EOT)	DC_4 (STOP)	② $	4	D	T		
0101	TC_5 (WRU)	ERROR	② %	5	E	U		
0110	TC_6 (RU)	SYNC	② &	6	F	V		
0111	TC_7 (BELL)	EOB	② ' (Apostr.)	7	G	W		
1000	FE_0	S_0	(	8	H	X		
1001	FE_1 (HT)	S_1	)	9	I	Y		
1010	FE_2 (NL)	S_2	:	*	J	Z		
1011	FE_3 (VT)	S_3	;	+	K	① [		
1100	FE_4 (FF)	S_4	, (Comma)	② <	L	① \		
1101	FE_5 (CR)	S_5	-	② =	M	①]		
1110	SO	S_6	.	② >	N	↑		ESCAPE
1111	SI	S_7	/	② ?	O	←		DELETE

2 cf. Note 2

NOTES CONCERNING THE FOUR TABLES

NOTE 1

The positions indicated by ① are reserved for the alphabetical characters of those countries where the alphabet includes more than 26 letters. The symbols [\ ] are recommended substitutions in those countries in which the alphabet is up to 26 letters.

NOTE 2

Consideration shall be given in the 7-bit set to exchanging the characters in the table with the characters as listed below :

$ with <
% " =
& " >
, " ?

NOTE 3

When collapsing from the 7-bit set into the 6-bit set a choice may be made on which characters to insert in the positions marked with footnote 3 depending upon whether the application is business or scientific, as follows :

Business		Scientific
£ or $ or currency sign	or	<
%	or	=
&	or	>

EXCERPS FROM DOCUMENT ISO/TC 97/WG B (France 1)6 E

Opinion of the French member-body
concerning character sets and coding

Considering the problem of coded sets which are intended for the interchange of information between equipments and data processing systems, the French member-body is of the opinion that a six-bit basic coded set should be available which, besides numerals, alphabetical characters, and special symbols will contain control characters.

This six-bit coded set should be reducable to an essentially numerical four-bit coded set.

If a seven-bit coded set is to be standardized, it must be easily reducable to a six-bit coded set.

The French member body is of the opinion that at a later stage the standardization of an height-bit coded set will become an obvious need. Such an eight-bit coded set should be equally compatible with the above mentioned six-bit coded set.

The French committee gave particular attention to the problem of reducing to six bits the seven-bit coded set proposed by the ASA. The committee considered the assignment of the control characters to the 32 positions provided for this purpose in the first two columns of the ASA set.

The character set attached to this document illustrates the following characteristics and criteria that the Commission considered essential.

A - General characteristics for a coded set, whatever the number of bits may be

1) Every graphic or control character is always represented by the same binary combination.

2) One binary combination may, in some cases, correspond to several graphic or control characters.

3) Graphic or control characters are said to belong to the same "family" when they are typical of the same uses, for instance :

   - the characters of an alphabet
   - the figures of a numeric system
   - the abbreviations of a text
   - the coding functions
   - data separators
   - medium or transmission separators
   - peripheral devices switching controls
   - peripheral devices specific controls
   - etc...

The binary combinations used for representing graphic or control characters in a given "family" must have consecutive values and contain the largest possible number of identical binary digits; these identical binary digits must, as far as possible, be those of higher value.

.../...

Other characteristics adopted for the construction of a six-bit coded set

1) The six-bit coded set must include control character.

2) These control character should be grouped, i.e. the binary combinations by which they are represented have consecutive values.

3) These control character are likely to be substituted for non essential graphic symbols.

4) The number of these control characters substituted for symbols may vary within a maximum range of eight.

5) To the combination of smaller binary value should correspond the more essential control characters and the less essential graphic characters.

Proposals for an arrangement of the control characters in a seven-bit coded set reducable into a six-bit set

In the table given in appendix to this document* the four following fields have been defined :

- positions 0 to 7 : (printing) device controls
- positions 8 to 15 : Transmission controls
- positions 16 to 23 : information and medium separators
- positions 24 to 31 : Device switching controls.

The arrangement of the control characters, in each of these fields, has been so chosen as to allow them to be partly or totally folded onto the 0-to-7 field of the six-bit set.

---

* Not reproduced here

2 März 1962 [illegible]

Attachment H

April 1962

ISO/TC 97 COMPUTERS AND INFORMATION PROCESSING

WG B CHARACTER SETS AND CODING

German Contribution: Information Processing Code

The German Standards Organization (DNA) has established a 6-bit-code for information processing and presents it as a working basis for ISO/TC 97/WG B.

	00	01	10	11
0000	Null	0	A	Q
0001	S_4 (End of Job)	1	B	R
0010	S_3 (End of Form)	2	C	S
0011	S_2 (New Line)	3	D	T
0100	S_1 (Horiz. Tab.)	4	E	U
0101	Space (S_0)	5	F	V
0110	Shift out 1)	6	G	W
0111	Shift in 1)	7	H	X
1000	& [2)	8	I	Y
1001	%] 2)	9	J	Z
1010	(	;	K	3)
1011	)	:	L	3)
1100	/	+	M	3)
1101	,	*	N	Currency Sign Basis 10 2)
1110	-	=	O	Escape
1111	.	' (Apostrophe)	P	Delete

1) If "Shift out" and "Shift in" are not required, the two positions may be used for more separators.

2) The charactersubset &, %, currency sign to be recommended for commercial use and the charactersubset [,] , Basis 10 to be recommended for use in programming languages.

3) Characters for use within certain areas may be placed in these positions subject to special agreement.

NMAH 310/3

Mr. J. F. Auwaerter 6/12

May 11, 1962

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

Technical Committee 97

Working Group B

REPORT OF MEETING OF MAY 2-4, 1962
PARIS, FRANCE

Notice of Meeting (Attachment A)
Conferees (Attachment B)
Agenda (Attachment C)
Working Documents:
- Activities of Working Group B (Attachment D)
- U. K. Specification (Attachment E)
- ASA Proposal (11/10/61) (Attachment F)
- Opinion of French Body (Attachment G)
- German Contribution (Attachment H)
- BSI Proposal (Attachment I)
- ASA Proposal (4/13/62) (Attachment J)

The President (H. Feissel of Machines Bull, Paris, France) stated that this meeting was called at the request of the American delegation and that AFNOR (Association Francaise de Normalisation) agreed.

Liaison representatives of Working Group B to the Working Group E (Programming Languages) meeting in Stockholm (May 8-10, 1962) were appointed; Mr. R. E. Utman, Secretary of Working Group E, was among the appointees.

The British delegation stated that their standard (Attachment E) is gaining wide acceptance in the Commonwealth, including machine tool control, however, they recognize the advances in theory and structure of coding work and will revise their standard to insure wider acceptance.

The American delegation presented the U. S. position, viz., the code has been approved by X3.2 and is now being voted on by X3 (ballot due approximately 7/1/62) and that it is proposed to revise the Proposed American Standard to take advantage of the work of the Europeans. It was also stated that if Working Group B agrees on a satisfactorily structured 7 bit

NMAH 310/3

set that the Bell Systems technical representatives would, in all probability, recommend implementation of the set in the Bell System.

The President was sympathetic with the Bell System's problem, but stated that the development and subsequent standardization of an international code takes time, however, in this particular case, he did attach a sense of urgency to the work at hand.

There was a brief discussion by the French delegation of the fact that all codes to date are directed towards teleprinters and punched tape, and non towards punched cards. The British delegation stated that the BSI considered the punched card code, during their development of their 6-bit set (see Attachment E), and made the decision to depart from a code which was easy to translate to and from punched cards and to develop a code which was easy to process.

The British Standards Institute has a standard for punched cards -- BS 3174:1959 Alphanumeric Punching Code for Data Processing Cards.

The German delegation stated that their proposal (see Attachment H) had not been passed up the line in the German Standards Organization (DNA) and therefore was fluid.

Mr. Cluff, representing ECMA, presented the latest thinking of ECMA (see Attachment K) The German delegation pointed out that that which Mr. Cluff presented was only a possible arrangement; a minority opinion within ECMA favors the reverse ordering of controls.

An ad hoc group was set up to examine the various documents and where they differ, an attempt should be made to find a compromise. During the ad hoc session, the following compromises were made:

1. The German delegation agreed to the alphabet beginning in position 0001 to allow the ad hoc group to proceed.
2. The French delegation agreed to the position of format effectors and separators in the bottom of the first and second columns, respectively, but stated that the argument for placing the

separators so as to be contiguous with the space (ƀ) in the 7-bit set is not valid, since this requirement would only exist for 7-bit computers which they do not believe will ever be implemented.

They also argued that the space (ƀ) should be in position 1000 of the first column of the 7-bit set so that the translation (7-bit to 6-bit and vice versa) will be simpler.

THE ECMA representative felt that the 6-bit set, related to the 7-bit code now under consideration, would eventually appear in punched cards, but that he was of theopinion that the assignment of space (ƀ) to the 0101 position in the 6-bit set would be a deterrent -- he did not elaborate.

The delegate from Union internationale des Chemins de Fer was concerned, as was the German delegation, with the problems associated with the transmission of the 6-bit code over existing teleprinter facilities if space (ƀ) remains in the all zeros position. In addition, the Union internationale des Chemins de Fer delegate stated that the 6-bit set should contain all of the symbols in CCITT #2 alphabet.

> **Note:** The 6-bit set of May 4, 1962 (final set) contains all of the symbols of the CCITT #2 alphabet except one; either the apostrophe or the question mark must be omitted, since they occupy the same position (011111) in the 6-bit set.

Two 7- and 6-bit codes were finally agreed upon. Attachment L was identified as proposal B and Attachment M was identified as proposal A; the difference is confined to the control area (first and second columns of the 7-bit set. All delegations were in favor of the control structure as contained in proposal B except the Germans who favored proposal A.

The following resolution was then voted on and passed unanimously:

> The Working Group decides that the analysis given in document 14 (with the addition of 4th May), together with the later table put on the board during 4th May* should be presented together and sent to all member bodies of the Working Group as soon as possible.

---

*Combined into Attachments L and M

These tabulations are referred to as A and B.

Both proposals, A and B, are seven-bit coded sets with a related six-bit coded set, but B, which is preferred by a majority of the delegations present at the meeting, results from compromises made by several delegations.

The Working Group requests its principal members to send their opinions to the secretariat for or against proposal B by 15th September, 1962.

The passage of the above resolution does not necessarily mean that all delegations are in complete agreement with the coded sets illustrated in Attachments L & M. The fact that there are two proposals for the structuring of the controls illustrates an area of basic disagreement, although, as stated previously, only one delegation (Germany) favored proposal A. Other areas of possible disagreement are as follows:

1. The Germans would prefer to interchange the asterisk and the colon and the plus sign and the semi-colon. It was believed that the British would also prefer this arrangement, however, they did not so indicate at the time. The arrangement illustrated in Attachment L provides a simpler 4-bit collapse, but does cause the British to lose the asterisk and plus sign when substituting 10 and 11. The Germans favored the change because of their desire to have both the asterisk and plus sign lower (binary-wise) than the digits.

2. There was a preference shown by the German delegation for interchanging the < > with [ ] . However, the British and American delegations preferred the arrangement illustrated in Attachment L; this arrangement is preferable for up-low teletypewriters.

3. The British delegation showed a preference for the ordering of the last four graphics in the first column of the 6-bit set as follows:

   , . - /

   They did not object to the arrangement illustrated in Attachment L; they stated that they required additional time to study.

4. The British delegation suggested that the four sumbols $ % & ' be interchanged with < = > ? in the 7-bit set to simplify the translation to the 6-bit set. The American delegation would not agree, since this would distort the typewriter type keyboard arrangement.

To complete the subject, Attachment N contains the keyboard arrangement which results from the code as illustrated in Attachment L.

J B Booth
J. B. Booth

JBB:amm

Att.

AMERICAN STANDARDS ASSOCIATION

10 East 40th Street

New York 16, New York

ISO/TC97/Working Group B - COMPUTERS AND INFORMATION PROCESSING

Date: 28 May 1962

Document Number: ISO/TC97/WGB
(USA - 4)

Return Address:
Mr. Leon Bloom
The National Cash Register Company
1401 East El Segundo Boulevard
Hawthorne, California

Subject: Action of ASA Subcommittee of X3.2 on Resolution #1 of WGB - 4 May 1962

Mr. J. Birle, Director General
Association Francaise De NORmalisation
23, Rue Notre-Dame Des Victoires
Paris, (2), FRANCE

Dear Mr. Birle:

The ASA X3.2 Subcommittee on Character Codes and Sets has considered Proposal B of Working Group B and in that regard have passed the following resolution by a vote of seven (7) for, and two (2) against:

" That X3.2 recommend to X3 that the USA support Proposal B of WGB Resolution 1 of 3 and 4 May 1962, subject to recommendations on Logical End of Media (LEM) and to satisfy requirements of X3.3 (transmission) and the needs of the Sterling areas; documentation of unanimous or majority and minority positions to be provided".

The changes indicated by the resolution are specifically the following:

1. Logical End of Media (LEM) to replace End of Block (EOB).

2. DC_0 is reserved for possible future use as a Data Link Escape.

3. The colon (:) and semi colon (;) has been interchanged with the asterisk (*) and plus (+) in order to better accommodate the Sterling monitary requirements in the 6-bit set.

NMAH ~~0~~ 310/3

The X3.2 Subcommittee has also modified its Proposed Standard Code For Information Interchange and is recommending to the X3 Sectional Committee that the modified code be considered as a National Standard rather than continuing to consider the previously proposed code. The modified code referred to here is the 7-bit code of Proposal B, Resolution 1, WGB, as ammended by the X3.2 Subcommittee. It may also be of interest that the Bell Telephone System is implementing this revised code as ammended by X3.2.

It is the hope of the majority of the X3.2 Subcommittee that Resolution 1, Proposal B of WGB be acted upon favorably by all of the active delegations in WGB and that the ammendments proposed by X3.2 will be considered by these delegations. We would certainly be anxious to hear of the progress being made in the various national bodies in consideration of the WGB Resolution and of any modifications to this resolution being considered by these national bodies.

Sincerely yours,

Leon Bloom

Leon Bloom, U. S. Representative
ISO/TC97/WGB

LB:jo

AMERICAN STANDARDS ASSOCIATION

10 East 40th Street

New York 16, New York

ISO/TC97/Working Group B - COMPUTERS AND INFORMATION PROCESSING

Date: 29 May 1962

Document Number: ISO/TC/97/ WGB
(USA - 5)

Return Address:
Mr. Leon Bloom
The National Cash Register Co.
1401 East El Segundo Boulevard
Hawthorne, California

Subject: Comments on Preliminary Draft of Resolutions; WGB - 4 May 1962

Mr. J. Birle, Director General
Association Francaise De NORmalisation
23, Rue Notre-Dame Des Victoires
Paris (2), FRANCE

G. M. WILSON
JUN 13 1962
ANS'D [illegible]
REF'D

Dear Mr. Birle:

I have received a copy of the preliminary drafts of the resolutions and the tables which resulted from the May meeting of Working Group B. I recognize that this is only a preliminary draft, nevertheless, I though that I should point out one or two apparent errors or oversights in the copy which I received.

1. Resolution #3 concerning the establishment of the Working Group as a Subcommittee was not included.

2. In Footnote #2, it is indicated that the colon (:) could be exchanged with the question mark (?). This should read that the apostrophe (') may be exchanged with the question mark (?).

3. In the 7-bit coded sets of tables A and B, Footnote #1 should appear in those positions where [\ ] appear.

NMAH 310/3

I am enclosing a copy of the Trip Report which I made to the other members of X3.2. I would appreciate it if you would read the report and let me know if my understanding of the results of the meeting are correct. Wide distribution of this report is being withheld until such time as I hear from you.

I would like to thank you very much once again for the hospitality shown to our delegations while we were in Paris. We are looking forward to an opportunity of meeting with you again.

Sincerely yours,

Leon Bloom

Leon Bloom, U. S. Representative
ISO/TC97/WGB

LB:jo

cc: H. Fiessel
✓ G. Wilson

REPORT ON THE MEETING OF ISO/TC97/WGB ON CHARACTER CODES AND SETS

Paris, May 2-4, 1962

Since the Autumn of 1960 there has been an active standardization effort underway in the United States Data Processing Industry under the auspices of the American Standards Association. The X3.2 Committee, whose scope includes standardization of character codes and sets, reached agreement in November 1961 on a Standard Code for Information Interchange. In March of 1962 ASA Sectional Committee X3 agreed to submit that code to its members for letter ballot. Responses are due by July 1, 1962. In the meanwhile, developments on the International Level were progressing rapidly.

As 1962 began the British Standards Institute (BSI) was about to publish a standard. The European Computer Manufacturers' Association (ECMA) had activated a Technical Committee to work on the problem and this Committee had made great strides in defining the areas of agreement amongst the various computer manufacturers, and in improving techniques in code design.

In the Spring of 1961 the International Standards Organization had established, under Technical Committee 97, Working Group B, which was to work for standardization of character codes and sets on an international level. Plans were rapidly developing for a meeting of ISO/TC97 in October 1962 at which time a meeting of WGB would also be held. We, in the United States, felt that if agreement were to be reached on an international standard the diverse views of the various active groups would have to be consolidated before each group solidified into any appreciable hardware, its own view.

We were fully aware of a number of areas of similarity in the X3.2 proposed standard, the BSI standard and in the work of ECMA TC-1. We were also aware of some differences which, if they could not be resolved within the next few months would become considerably harder to resolve in the future. In order to ascertain what the likelihood of these differences being resolved was, Mr. John Auwaerter* and I went to Europe in January to discuss the situation with various members of the European data processing community. As a result of this trip, we reached the

---

* Director of Product Development, Teletype Corporation, Member of X3.2

RESOLUTION 1

The Working Group decides that the analysis given in document 14 (with the addition of 4th May), together with the later table put on the board during 4th May should be presented together and sent to all member bodies of the W.G. as soon as possible.*

The tabulations are referred to as A and B.

Both proposals, A and B, are 7-bit coded sets with a related 6-bit coded set, but B which is preferred by a majority of the delegations present at the meeting, results from compromises made by several delegations.

The W. G. requests its P. members to send their opinions to the secretariat for, or against, proposal B by 15th September 1962.

RESOLUTION 2

The W. G. decides that the paper referred to in Resolution 1 should form the liaison report to be sent to W. G. E. for their Stockholm meeting. Mr. Henry, assisted by Chadwick, Eadie and Utman, is requested to represent this Working Group at W. G. E.

RESOLUTION 3 **

The Working Group decides to recommend to Technical Committee ISO/TC97 that its future status should be that of a Subcommittee.

---

* See Tables on following page.

** The U. K. abstained from voting on this resolution.

B

B 7 Bit Coded Set

B 6 Bit Coded Set

				000	001	010	011	100	101	110	111	00	01	10	11
0	0	0	0	TC_0 (NULL)	DC_0	SPACE	0	@	P	UNASSIGNED	UNASSIGNED	SPACE	0	NULL	P
0	0	0	1	TC_1 (SOM)	DO_1	!	1	A	Q			F_1 (HT)	1	A	Q
0	0	1	0	TC_2 (EOA)	DC_2	"	2	B	R			F_2 (NL)	2	B	R
0	0	1	1	TC_3 (EOM)	DC_3	#	3	C	S			F_3 (VT)	3	C	S
0	1	0	0	TC_4 (EOT)	DC_4 (STOP)	② $	4	D	T			F_4 (FF)	4	D	T
0	1	0	1	TC_5 (WRU)	ERROR	② %	5	E	U			F_5	5	E	U
0	1	1	0	TC_6 (RU)	SYNC	② &	6	F	V			SO	6	F	V
0	1	1	1	TC_7 (BELL)	EOB	② ' (Apost)	7	G	W			SI	7	G	W
1	0	0	0	FE_0	S_0	(	8	H	X			(	8	H	X
1	0	0	1	FE_1 (HT)	S_1	)	9	I	Y			)	9	I	Y
1	[illegible]	1	0	FE_2 (NL)	S_2	:	*	J	Z			:	10 or *	J	Z
1	0	1	1	FE_3 (VT)	S_3	;	+	K	① [			;	11 or +	K	① or [
1	1	0	0	FE_4 (FF)	S_4	, (comma)	② <	L	① \			, (comma)	③ Cur Sign or <	L	① or \
1	1	0	1	FE_5 (CR)	S_5	–	② =	M	①]			–	③ % or =	M	① or]
1	1	1	0	SO	S_6	.	② >	N	↑		ESCAPE	.	③ & or >	N	ESCAPE
1	1	1	1	SI	S_7	/	② ?	O	<–		DELETE	/	' (Apostr)	O	DELETE

① cf. Note 1
② cf. Note 2
③ cf. Note 3

conclusion that agreement on an international level was achievable but that a great deal of work would be required in order to reach that agreement.

Under the direction of M. Fiessel of Cie des Machines BULL, acting chairman of the WGB, the following time-table was drawn up:

1. March 1962, X3.2 would send a delegation to ECMA TC-1 Meeting to further our understanding of each others problems.
2. May 1962, a meeting of ISO/TC97/WGB would attempt to work out a proposal for a single code to be presented to ISO/TC97 in October.
3. October 1962, ISO/TC97 plenary session.

The reason for the delay between steps 2 and 3 was to permit the agreed upon proposal to be presented to the international standards body at least 4 months before the plenary session. This period is required if action is to be taken at the plenary session.

Between steps 1 and 2 and 3, each of the groups was to continue meeting in order to study the various proposals more fully, and arrive at an understanding on a national position. In fact, between January and May, additional personal contact and much correspondence was carried on.

Paris was chosen as the meeting place for the May meeting of WGB and France acted as the host country. The following are the nations and international groups which were represented at the meeting together with a list of the delegates of each group:

Secretariat:	France	
Chairman:	M. H. Fiessel	Cie des Machines BULL
	M. P. Giret	AFNOR
	Mme. Ladefroux	AFNOR
Interpreter:	Mme. Umansky	

FRANCE:

MM.	R. Frontard *	Director of AFNOR
	Beaugonin	Cie des Machines BULL
	Durand	Cie des Machines BULL
	J. M. Guilhaumou	Cie IBM France
	H. Henry	l 'Electricite de France

GERMANY:

Dr. Ulbrich *	Telefunken
Dr. Bauer	University of Mainz
Dr. Lockemann	Siemens & Halske

ITALY:

Mr. Richard Gottlieb *	Olivetti

UNITED KINGDOM:

MM.	Chadwick *	British Standards Institute
	W. Eadie	IBM United Kingdom, Ltd.
	H. McG. Ross	Ferranti, Ltd.
	J. R. W. Smith	British Telecommunications Research Ltd.

UNITED STATES: **

MM.	L. Bloom *	The National Cash Register Company
	R. E. Blue	IBM
	J. Booth	Teletype Corporation
	L. L. Griffin	Navy Department, Navy Management Office
	R. E. Utman	Sperry Rand, UNIVAC
	A. L. Whitman	Bell Telephone Laboratories

* Head of Delegation

** Each member of the U. S. delegation is a member of ASA Sectional Committee X3.2 and each, in his own way, contributed enormously to the success of the meeting.

ECMA: (European Computer Manufacturer's Association)

Mr. E. G. Cluff** International Computers and Tabulators

UIC: (International Union of Railways)

Mr. M. P. Bienfait* Belgian National Railways

The efficiency and dispatch with which the meetings were conducted can perhaps best be illustrated by the fact that the first seven items on the agenda were dispensed with during the meeting's first hour. When it is considered that all English statements had to be translated into French, all French statements into English (the two official languages of the meeting) and that the interpreter was unfamiliar with some of the terms used, the efficiency of the Chairman and the skill of the interpreter can be doubly appreciated.

During the afternoon of the first day, each delegation presented a technical proposal, or statement, on a standard code for consideration by WGB. In each instance, the official status of the proposal within the nation or international organization represented was clearly explained. It was recognized that although none of the representatives could commit the nations or organizations they represented to a final technical solution, an attempt would have to be made to arrive at agreement within the working group so that delegations could return to their respective home organizations with a specific proposal to be considered and acted upon.

It was in this spirit that the real work of the group began on the following morning with a meeting of an ad hoc committee which was formed to either resolve, or clearly identify, the areas of difference amongst the various proposals. During the next two days, meetings of the ad hoc committee and of the full Working Group narrowed down the areas of difference so that on the third day of the meetings the three resolutions listed below were prepared by the Resolutions Committee (ably assisted by Mr. Chadwick of the BSI) and were passed unanimously by the full Working Group. The key resolution is Resolution 1 which requests that each national delegation vote, by September 15, on a single standard which is a 7-bit set with a related 6-bit coded set.

A

ISO/TC 97 WGB - 3 and 4 May 1962

A 7 Bit Coded Set

				000	001	010	011	100	101	110	111
0	0	0	0	NULL	UNASSIGNED	SPACE	0	@	P	UNASSIGNED	UNASSIGNED
0	0	0	1	TC 4 (EOT)	DC 4 (STOP)	!	1	A	Q		
0	0	1	0	TC$_3$ (EOM)	DC 3	"	2	B	R		
0	0	1	1	TC 2 (EOA)	DC 2	#	3	C	S		
0	1	0	0	TC 1 (SOM)	DC 1	② $	4	D	T		
0	1	0	1	WRU	ERROR	② %	5	E	U		
0	1	1	0	RU	SYNC	② &	6	F	V		
0	1	1	1	BELL	EOB	② ' (Apost)	7	G	W		
1	0	0	0	UNASSIGNED	S_5 (LEM)	(	8	H	X		
1	0	0	1	FE 4 (FF)	S_4	)	9	I	Y		
1	0	1	0	FE 3 (VT)	S_3	:	*	J	Z		
1	0	1	1	FE 2 (LF)	S_2	;	+	K	[①		
1	1	0	0	FE 1 (HT)	S_1	, (comma)	② <	L	\ ①		
1	1	0	1	CR	S_0	–	② =	M	] ①		
1	1	1	0	SO	UNASSIGNED	.	② >	N	↑		ESCAPE
1	1	1	1	SI	UNASSIGNED	/	② ?	O	<-		DELETE

A 6 Bit Coded Set

00	01	10	11
NULL	0	UNASSIGNED	P
F_4 (FF)	1	A	Q
F_3 (VT)	2	B	R
F_2 (NL)	3	C	S
F_1 (HT)	4	D	T
SPACE	5	E	U
SO	6	F	V
SI	7	G	W
(	8	H	X
)	9	I	Y
:	10 or *	J	Z
;	11 or +	K	① or [
, (comma)	③ Cur Sign or <	L	① or \
–	③ % or =	M	① or]
.	③ & or >	N	ESCAPE
/	' (Apostr)	O	DELETE

① cf. Note 1
② cf. Note 2
③ cf. Note 3

FOOTNOTES:

NOTE 1

The positions indicated by 1 are reserved for the alphabetical characters of those countries where the alphabet includes more than 26 letters. The symbols [\ ] are recommended substitutions in those countries in which the alphabet is up to 26 letters.

NOTE 2

Consideration shall be given in the 7-bit set to exchanging the characters in the table with the characters as listed below:

$	with	<
%	"	=
&	"	>
'	"	?

NOTE 3

When collapsing from the 7-bit set into the 6-bit set a choice may be made on which characters to Insert in the positions marked with Footnote #3 depending upon whether the application is business or scientific, as follows:

Business		Scientific
£ or $ or currency sign	or	<
%	or	=
&	or	>

The spirit of cooperation and hard work on the part of all delegations was remarkable and gratifying. Each delegation appeared to realize that without such a spirit little would be gained and much would be lost. We do not believe that the requirements of any of the delegations was seriously compromised by the concessions which were made. We do believe that all interests were positively served by having made concessions so that agreement could be reached.

The facilities provided by the host country, France, including secretarial and interpretative assistance, was all that could be desired and we would like to take this opportunity on behalf of the entire United States delegation to convey our thanks.